1.3.43. NON-CONTACT AIR-COUPLED ULTRASONIC MEASUREMENT OF GEOMETRY PARAMETERS OF METALLIC STRUCTURES

Rybitsky I., Karpash O., Yavorsky A., Karpash M.,
Ivano-Frankivsk National Technical University of Oil and Gas,
Ivano-Frankivsk, Ukraine

The contribution is devoted to the problem of non-contact inspection of metallic structures using acoustic air-coupled method.

The possibility and reasonability of non-contact ultrasonic transducers usage for thickness testing has been investigated and proved. Method of non-contact acoustic measurement of thickness has been improved based on usage of matching layer for elimination of ultrasonic wave energy losses and application of artificial neural networks for data processing and detection of highly noised signals. The mathematical model of ultrasonic wave propagation in the inspected material was developed and actual acoustic waves' energy losses have been calculated for the non-contact thickness measurement. The physical (acoustic impedance) and geometrical (thickness) parameters of matching layer of non-contact transducers have been calculated. The ultrasonic transducer for thickness measurement have been designed and manufactured using results of simulation. Experimental investigations proved the possibility of non-contact ultrasonic thickness measurement with relative accuracy 4.5%.